

REMARKS

After entry of this amendment claims 1-59 will be pending. Applicants thank the Examiner for her indication that claims 41, 48 and 55 would be allowable if rewritten in independent format.

Claim 46 has been amended to delineate that non-silicon adhesion promoters are covered. Support for this amendment can be found at page 10, line 24 to page 11, line 2. By action taken here, Applicants in no way intend to surrender any range of equivalents beyond that needed to patentably distinguish the claimed invention as a whole over the prior art. Applicants expressly reserve all such equivalents that may fall in the range between Applicants' literal claim recitations and combinations taught or suggested by the prior art.

Obviousness-Type Double Patenting Rejection

The Examiner provisionally rejected claims 1, 2, 5-9 and 14-16 under the judicially created doctrine of obviousness type double patenting over claims 1-4 of co-pending application 09/708,965 in view of U.S. Patent No. 6,183,901 to Ying et al. ("Ying"). Applicants acknowledge this rejection and will take further action under advisement when the other outstanding rejections in this application are withdrawn.

Rejection of claims 1, 3, 5-11, 14-17, 22-30, 33 and 34 under 35 U.S.C. §102(e)

The Examiner rejected claims 1, 3, 5-11, 14-17, 22-30, 33 and 34 under 35 U.S.C. §102(e) as anticipated by Ying. This rejection is respectfully traversed.

The presently claimed invention is distinct from Ying. In the present claim 1, a precursor coating is applied to at least a first side of a fuel cell plate.

In the present specification at page 5, lines 4-5, it states that "[e]ach of the fuel cells 102 includes a multi-layer active portion 104 sandwiched between a pair of bipolar plates 106 or between a bipolar plate 106 and an end plate 108." Further, the active portion 104 is described as including a membrane electrolyte assembly (MEA) 110 disposed between two backing layers 112. The MEA 110 may include a polymer electrolyte membrane (PEM) 114

disposed between an anode 116 and a cathode 118. As can be seen from the above description the active portion is different from the bipolar or end plates 106, 108.

At page 6, lines 3-4, the present application discloses that a coating 132 is applied to either or both surfaces of the fuel cell plates 106 and 108. As discussed at page 6, lines 4-6, the purpose of the coating 132 is to prevent the mixing of disparate fluid streams during the operation of the fuel cell. Furthermore, at page 2, line 22, the plates are described as gas-impermeable and as having channels that distribute fluids to the active portion. From this, it is apparent that the fuel cell plates 106 and 108 and coating 132 are not porous to gases or liquids; otherwise, the fuel cell would not operate correctly.

Despite the Examiner's assertion to the contrary, Ying does not disclose the application of a coating to a fuel cell plate. In the abstract, as the Examiner acknowledges, Ying discloses that the protective coating is applied to a separator. At column 1, lines 47-50, Ying defines a separator as the part of the electrolyte element that separates or insulates the anode from the cathode. The electrolyte element is also disclosed to include an aqueous or non-aqueous electrolyte in the pores of the separator. See column 1, lines 47-50. Ying further makes clear, at column 1, lines 36-38, that the electrolyte element is interposed between the anode and the cathode. From the abstract and background of Ying, it is clear that that electrolyte element and the protective coating are similar to the MEA as discussed in the present application. The MEA 110 is disposed between the anode and the cathode in the same way that the electrolyte element of Ying is disposed between the anode and the cathode. Because the electrolyte element includes the protective coating, the protective coating of Ying is also disposed between the anode and the cathode. In contrast, the coating 132 of the present invention is not disposed between the anode and the cathode but rather is disposed on the plates 106 and 108 that separate respective active portions 104 from each other. In sum the protective coating of Ying is utilized in a wholly different area of the fuel cell from the coating 132 in the present application.

In addition, the protective coating of Ying is porous. The Examiner's attention drawn to column 13, line 65 to column 14, line 22, where Ying states that "[s]uitable polymeric protective coatings should add flexibility and toughness to the separator while at the same time allowing, cations, such as lithium ions, to pass through the separator." Furthermore, at

column 14, line 53, Ying acknowledges that the protective coating has a certain required amount of porosity. A coating that is porous can hardly function in place of a coating that is selected specifically because it is non-porous.

Applicants also respectfully disagree that the microporous layers of Ying's invention would read on a "plate" and thus support anticipation of the present invention. Although comprised nominally of metal oxides, the microporous layers in Ying are in fact formed from liquid solutions, (e.g., Ying column 20, lines 63-64; column 21, lines 10-11) which are "dried" (e.g., column 21, line 18) to form very thin "coating" layers that contain pores that are substantially continuous across the entire layer (column 16, lines 50-54). The microporous layers readily absorb liquids, as indicated by the calculation of pore volume by measuring the increase in weight of the layer upon addition of liquid (e.g., column 16, line 65-column 17, line 11). Due to its porosity, the microporous layer is further described as functioning as an "ultrafiltration membrane" column 18, line 14). Nowhere does Ying teach or suggest that its microporous layers are "plates", nor would one of ordinary skill in the art consider them "plates" in view of their membrane-like nature and porosity.

Thus, it can be seen that Ying discloses a coating for use in a completely different area and with a completely different function from the coating 132 of the presently claimed invention.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described in a single prior art reference. See MPEP §2131. Contrary to the assertion of the Examiner, at least the feature of a non-porous coating on a fuel cell plate is not disclosed, taught or suggested in Ying, so the rejection is unsupported by the art and should be withdrawn.

For at least this reason, claims 1, 17, 22 and 33 allowable over the applied art. Claims 3, 5-11 and 14-16, which depend from claim 1, claims 23-30, which depend from claim 22, and claim 34, which depends from claim 33, are likewise allowable over the applied art. Withdrawal of the rejection is respectfully requested.

Rejection of claims 1, 9-13, 22 and 23 under 35 U.S.C. §102(e)

The Examiner rejected claims 1, 9-13, 22 and 23 under 35 U.S.C. §102(e) as anticipated by U.S. Patent No. 6,337,120 to Sasaki et al. ("Sasaki"). This rejection is traversed.

The presently claimed invention is distinct from Sasaki. The problems with Sasaki are similar to the problems of Ying. Despite the Examiner's assertion to the contrary, Sasaki does not disclose the application of a coating to a fuel cell plate. As acknowledged by the Examiner, Sasaki discloses only a gasket for fuel cells that are made integral to porous carbon plates. See column 3, lines 28-32. Sasaki discloses that the porous carbon plate may be used "as an electrode or separator for fuel cells." See column 4, line 22. Sasaki uses the term 'separator' in the same way Ying used the term; that is, a porous layer disposed between the anode and the cathode, which together make up an electrode. See column 1, lines 19-40. As demonstrated above, coating 132 of the present invention is applied plates 106 and 108, not to the active portion 104. Furthermore, coating 132 is applied to a surface that is non-porous. Thus, it can be seen that Sasaki discloses a coating for use in a completely different area and with a completely different function from the coating 132 of the presently claimed invention.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described in a single prior art reference. See MPEP §2131. Contrary to the assertion of the Examiner, at least the feature of a non-porous coating on a fuel cell plate is not disclosed, taught or suggested in Sasaki, so the rejection is unsupported by the art and should be withdrawn.

For at least this reason, claims 1 and 22 allowable over the applied art. Claims 9-13, which depend from claim 1, and claim 23, which depends from claim 22, are likewise allowable over the applied art. Withdrawal of the rejection is respectfully requested.

Rejection of claims 46, 47 and 49 under 35 U.S.C. §102(b)

The Examiner rejected claims 46, 47 and 49 under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,128,391 to Shustack ("Shustack"). This rejection is respectfully traversed.

Claim 46 has been amended to clarify that the only adhesion promoters that do not include silicon are covered. Shustack clearly limits its disclosure to adhesion promoters that are based on silicon. At column 8, lines 61-64, Shustack states "[t]he third essential ingredient of the composition is the organofunctional silane adhesion promoter" (emphasis added).

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described in a single prior art reference. See MPEP §2131. Contrary to the assertion of the Examiner, at least the feature of a non-silicon based adhesion promoter is not disclosed, taught or suggested in Shustack, so the rejection is unsupported by the art and should be withdrawn.

For at least this reason, claim 46 is allowable over the applied art. Claims 47 and 49, which depend from claim 46 are likewise allowable over the applied art. Withdrawal of the rejection is respectfully requested.

Rejection of claims 2-4, 6, 14, 17-19, 21, 24, 25, 28-36 and 38 under 35 U.S.C. §103

The Examiner rejected claims 2-4, 6, 14, 17-19, 21, 24, 25, 28-36 and 38 under 35 U.S.C. §103 as being obvious over Sasaki in view of U.S. Patent No. 5,667,227 to Boldt ("Boldt"). This rejection is respectfully traversed.

The problems with Sasaki discussed above with respect to the anticipation rejection apply with equal force to the present obviousness rejection.

Applicants agree that Sasaki does not disclose the use of screen printing or exposing a fuel cell plate to at least two different wavelengths of radiation. Boldt, however, does not fill all the gaps in Sasaki. As demonstrated above, Sasaki discloses the use of a gasket on a porous carbon plate. Combining Sasaki with Boldt will not produce the presently claimed invention. Using the materials disclosed in Boldt to make the gasket of Sasaki would still produce a gasket that is integral to a porous carbon separator. Boldt neither discloses nor suggests moving the gasket from the porous carbon separator to a non-porous fuel cell plate.

Because Sasaki and Boldt do not teach or suggest each feature of the presently claimed invention, the Examiner fails to establish a prima facie case of obviousness. See MPEP §2143. Accordingly, Applicants respectfully request that this rejection be withdrawn.

Rejection of claim 20, 37, 39, 40 and 42-45 under 35 U.S.C. §103

The Examiner rejected claims 20, 37, 39, 40 and 42-45 under 35 U.S.C. §103 as being obvious over Sasaki in view of Boldt, and further in view of Shustack. This rejection is respectfully traversed.

The problems with Sasaki discussed above with respect to the anticipation rejection apply with equal force to the present obviousness rejection.

Applicants agree that Sasaki and Boldt do not disclose the use of both aliphatic oligomers and epoxy acrylic oligomers or the use adhesion promotes. Shustack, however, does not fill all the gaps in Sasaki and Boldt. As demonstrated above, Sasaki discloses the use of a gasket on a porous carbon plate. Combining Sasaki and Boldt with Shustack will not produce the presently claimed invention. Using the materials disclosed in Boldt and Shustack to make the gasket of Sasaki would still produce a gasket that is integral to a porous carbon separator. Shustack does not disclose or suggest moving the gasket from the porous carbon separator to a non-porous fuel cell plate.

Indeed, Shustack is a reference from a non-analogous art. Specifically, one skilled in the art of forming gaskets would not look to the art of inks and protective coatings for beverage cans. Shustack is clear that its related art is beverage can inks and coatings. See column 1, lines 14-33, where Shustack distinguishes his invention from known methods of printing on and coating aluminum beverage cans. In particular, Shustack is trying to overcome is the problem of displacement of the ink and protective coating when the beverage can blank is worked (shaped) or pasteurized after the ink and/or protective coating is applied. See column 3, lines 21-30. So, Shustack relates to a totally different field than the present invention: beverage can inks and coatings versus gaskets for fuel cells. In addition, Shustack attempts to overcome a problem that is not apart of the present invention. Presently, the fuels plates need not be shaped or pasteurized after the ink/coating is applied. Thus, Applicants respectfully submit that one skilled in the art of making gaskets would not look to Shustack.

There is no motivation to combine Shustack with Sasaki and Boldt. The disclosures of Boldt and Shustack are directed to different problems and provide different solutions to those problems. Boldt is directed to gaskets that have improved physical properties such as

increased tensile strength elongation and hardness. Furthermore, Boldt is directed to an improved method of curing gaskets that uses less energy and is quicker. The gaskets of Boldt must withstand immersion in baths of automotive oils, engine coolants and boiling water for at least 70 hours. Shustack on the other hand is directed to inks and coating for beverage cans that have decreased shrinkage upon curing, while also having improved elongation and adherence to the can upon shaping. Furthermore, Shustack is directed to inks and coating that can withstand pasteurization; i.e., immersion in 40°C to 100°C water for about 30 minutes. One skilled in the art of gaskets would hardly be motivated to look to a coating that withstands pasteurization in water for 30 minutes when the desired gasket must withstand much harsher conditions; i.e., immersion in boiling water, engine coolant or automotive oils for 70 hours. For this reason, there is no motivation to combine Shustack with Sasaki and Boldt.

Because Sasaki, Boldt and Shustack do not teach or suggest each feature of the presently claimed invention, because Shustack is not analogous art and because there is no motivation to combine references, the Examiner fails to establish a prima facie case of obviousness. See MPEP §2143. Accordingly, Applicants respectfully request that this rejection be withdrawn.

Rejection of claims 51, 52, 58 and 59 under 35 U.S.C. §103

The Examiner rejected claims 51, 52, 58 and 59 under 35 U.S.C. §103 as being obvious over Boldt in view of Shustack. This rejection is respectfully traversed.

Applicants agree that Boldt does not disclose the use of both aliphatic acrylic oligomers and epoxy acrylic oligomers on the use of adhesion promoters.

As discussed above, there is no motivation to combine Boldt with Shustack. The disclosures of each are directed to different problems and provide different solutions to those problems. Boldt is directed to gaskets that have improved physical properties such as increased tensile strength elongation and hardness. While Shustack is directed to inks and coating that can withstand pasteurization.

Furthermore, Shustack is a reference from a non-analogous art, as described above. Specifically, one skilled in the art of forming gaskets would not look to the art of inks and protective coatings for beverage cans.

Because there is no motivation to combine Boldt with the teachings of Shustack to meet the claimed invention and because Shustack is not analogous art, the Examiner fails to establish a prima facie case of obviousness. See MPEP §2143. Accordingly, Applicant respectfully requests that this rejection be withdrawn.

CONCLUSION

For at least these reasons, this application is now in condition for allowance. It is believed that any additional fees due with respect to this paper have already been identified in any transmittal accompanying this paper.

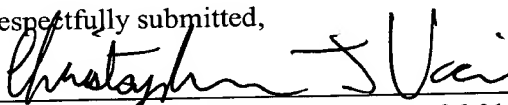
However, if any additional fees are required in connection with the filing of this paper that are not identified in any accompanying transmittal, permission is given to charge account number 18-0013 in the name of Rader, Fishman and Grauer PLLC.

If the Examiner has any questions or comments, she is kindly urged to call the undersigned to facilitate prosecution.

Date:

10/18/02

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MARKED UP VERSION OF AMENDED PARAGRAPHS

Second full paragraph on page 6:

The coating 132, which is applied on the plates 106, 108 in a fluid state and then solidified in situ, comprises a blend of one or more reactive coating precursors that are subsequently polymerized and/or cross-linked. Here, "reactive" means that the components of the coating 132 react with one another other or self-react to cure (solidify); such materials are also referred to as thermosetting resins. Depending on the type of reactive components employed, the coating 132 can be cross-linked and/or polymerized using any number of mechanisms, including oxidative curing, moisture curing, thermal curing, high energy radiation curing (e.g., ultraviolet curing, electron beam curing), condensation and addition polymerization, and the like.

MARKED UP VERSION OF AMENDED CLAIMS

46. An ultraviolet radiation curable coating precursor, comprising:
- an acrylated aliphatic urethane oligomers;
 - an acrylated epoxy oligomers;
 - a mono-functional monomer for reducing viscosity of the coating precursor;
 - a multi-functional monomer for increasing cross-link density;
 - a non-silicon based ~~an~~ adhesion promoter; and
 - a photoinitiator.